The Faculty of Medicine at Harvard University
Curriculum Vitae

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Place of Birth: Corfu, Greece

Education

1985	MD	Medicine	Siena University, Italy
1999	PhD	Behavioral Neurosciences	Boston University School of Medicine

Postdoctoral Training

10/1985-09/1989	Resident	Anesthesiology	Siena University, Italy
10/1990-09/1991	Resident (Full-time)	Psychiatry	Siena University, Italy
10/1991-09/1994	Resident (Part-time)	Psychiatry	Siena University, Italy
10/1991-09/2000	Research Fellow in Neurology	Clinical research	Massachusetts General Hospital
12/1996-01/1997	Visiting Research Fellow	Clinical research	Wellcome Department of Cognitive Neurology, University College, London, UK

Faculty Academic Appointments

04/1999-06/2003	Instructor	Neurology	Harvard Medical School
07/2003-10/2007	Assistant Professor	Neurology	Harvard Medical School
11/2007-08/2008	Assistant Professor	Psychiatry	Harvard Medical School
09/2008-05/2021	Associate Professor	Psychiatry	Harvard Medical School
06/2021-present	Professor	Psychiatry	Harvard Medical School

Appointments at Hospitals/Affiliated Institutions

1978-1985	Research Assistant	Microbiology	Siena University, Italy
1985-1989	Graduate Assistant	Medical Physics	Siena University, Italy
1986-1989	Visiting Scientist and Lecturer	Posturography and Biomagnetism	UFR-Paris Nord, Bobigny, France
1989-1990	Graduate Assistant	Institute of Mental & Nervous Disorders	Siena University, Italy
1991-1994	Research Fellow		Massachusetts General Hospital
1992-1995	Research Scientist		Memorial Veterans Administration Medical Center, Bedford, MA
2000-present	Assistant	Developmental Biology	Massachusetts General Hospital
2008-present	Research Scientist	Psychiatry	Massachusetts General Hospital
2013-present	Neuroscientist	Clinical Research	McLean Hospital
2014-present	Research Scientist	Radiology	Brigham and Women's Hospital
2018-present	Honorary Member	Neurosciences	Instituto Universitario de Neurociencias, Universidad de La Laguna San Cristobal de La Laguna Tenerife, Spain
2018-present	Honorary Member	Neurosciences	Medical and Audiovisual Technology Group (GTMA), Biomedical and Health Research Institute (IUIBS), Universidad de Las Palmas de Gran Canaria Las Palmas, Spain

Major Administrative and Leadership Positions

Local

1999-2008	Chief of Neuroanatomy, Center for Morphometric Analysis	Massachusetts General Hospital
2001-2009	Co-Director, Center for Morphometric Analysis	Massachusetts General Hospital
2008-present	Director, MGH Morphometric Analysis Center Core	Massachusetts General Hospital
2008-present	Director, Center for Morphometric Analysis (CMA)	Massachusetts General Hospital
2010; 2014	Course Director, Anatomical-Numerical Models of Brain and non-Brain Tissues and their Medical Applications, Department of Psychiatry	Massachusetts General Hospital
2011-present	Co-Director, Center for Neural Systems *investigations* (CNS*i*)	Massachusetts General Hospital

2013-present	Director of Computational Imaging Anatomy	Brigham and Women's Hospital

Committee Service

Local

2002	Organizing steering committee for Biomedical Imaging Brainstorm 2002: The future of neuroimaging	Athinoula A. Martinos Center Massachusetts General Hospital
2007-present	Research Psychiatry committee	Massachusetts General Hospital
2011-present	Institutional Review Board (IRB) Committee	Massachusetts General Hospital
2015-present	Psychiatry Departmental Research Quarterly Committee	Massachusetts General Hospital
2015-present	Psychiatry Research Steering Committee	Massachusetts General Hospital

Professional Societies

1988-present	Academy of Sciences of Siena (detta "dei Fisiocritici") Italy
1999-present	Society for Neuroscience (SFN)

Grant Review Activities

2010	Netherlands National Initiative Brain and Cognition Brain and Cognition: Societal Innovation in Health Care, Education and Social Safety	NIBC Ad hoc reviewer
2013	The Netherlands Organization for Health Research and Development Klinische Fellows Program	ZonMw Ad hoc reviewer
2014	National Institute of General Medical Sciences (NIGMS) Special Emphasis Panel for (FOA: PAR-14-035**)** Centers for Biomedical Research Excellence (COBRE)	NIH Ad hoc reviewer
2014-2015	Swiss National Science Foundation (Division III: Biology and Medicine)	SNSF Ad hoc reviewer
2016-2017	Swiss National Science Foundation	SNSF Ad hoc reviewer
2018-2019	Swiss National Science Foundation	SNSF Ad hoc reviewer

Editorial Activities

Editorial Board Member

03/2013-present Brain Imaging and Behavior

09/2018-present Archives of Behavioral Addictions

Ad hoc Reviewer

American Journal of Psychiatry
Archives of General Psychiatry
Biological Psychiatry
Brain and Language
Brain Structure and Function
Cerebral Cortex
Human Brain Mapping
Neuroimage
Neuroscience
Schizophrenia Research: Neuroimaging
Scientific Reports - Nature

Honors and Prizes

1990	Fellowship	Italian Foreign Ministry
1997	The Henry I. Russek First Prize Award	Boston University School of Medicine
1998	The Carol Bibber Award in Behavioral Neuroscience	Boston University School of Medicine
1998	Young Investigator Award	National Alliance for Research on Schizophrenia and Depression (NARSAD)
2012	Excellent Investigator Award	Chinese Association of Acupuncture-Moxibustion, Beijing, China
2014	Best Paper Award	International Academy, Research, and Industry Association (IARIA) COGNITIVE 2014, Sixth International Conference on Advanced Cognitive Technologies and Applications Venice, Italy
2016	Honorary President	Society of Physicians and Surgeons of Corfu Corfu, Greece
2019-2020	Hanse-Wissenschaftskolleg (HWK) Fellowship	Hanse-Wissenschaftskolleg Institute for Advanced Study (HWK), 27753 Delmenhorst, Germany

Research Funding Information

<u>Past</u>

Federal

1999-2004 Co-Investigator NIH/NIMH R01MH050647
(PI: J. Goldstein)
A Neuron Development Study of Schizophrenia

Program Project studied the basic human neuroscience of schizophrenia.

1999-2004 Co-Investigator NIH/NIMH R01MH060219
(PI: S. Rauch)
Basal Ganglia Function in OCD
Tested hypothesis regarding basal ganglia dysfunction in OCD using MRI and cognitive neuroscience methods.

2000-2005 Co-Investigator NIH/NIDA P01DA009467
(PI: B. Rosen)
Functional Brain Mapping of Cocaine Addiction (Core A)
Program Project studied the basic human neuroscience of cocaine addiction.

2002-2005 Co-Investigator NIH/NCCAM R21AT000978
(PI: K. Hui)
Modulatory Effect of Acupuncture on Human Brain Activity
Compared the central effects of acupuncture points of different meridians (specific routes of acupuncture points) and of different segmental innervations to determine the regional specificity of limbic and somatosensory areas.

2001-2006 Co-Investigator NIH/NIDA R01DA014118
(PI: H. Breiter)
Cocaine Addiction -- Alterations in Reward Circuitry
This study investigated functional and structural brain correlates in reward circuitry of subjects with cocaine dependence using structural and functional MRI.

2001-2010 Co-Investigator NIH/NIAAA R37AA07112
(PI: M. Oscar-Berman)
Affective and Conative Changes in Alcoholism
This study investigated emotional and memory abnormalities in long-term sober alcoholic subjects and controls using structural and functional MRI.

2002-2004 PI NIH/NIA R03AG20829
Neuroimaging and Functional Senescence in the Aging Monkey
The goal of this project was to study white matter fiber pathways in the young and old monkey and to characterize their changes due to aging using MRI.

2002-2007 Co-Investigator NIH/NINDS R01NS034189
(PI: D. Kennedy)
Anatomic Morphologic Analysis of MR Brain Images
This study aimed to generate a database of structural MRI datasets for public use.

2002-2007 Co-Investigator NIH/NCRR R01RR016594
(PI: B. Fischl)
Automated Analysis of Healthy and Diseased Brain Tissue
In this grant application support was sought to construct a set of accurate and automated tools for the analysis of structural neuroimaging data.

2002-2007 Co-Investigator NIH/NIMH R01MH063951
(PI: L. Seidman)

Family Study of Psychosis -- Brain Genes & Prenatal Risk
Tested hypotheses that prefrontal-hippocampal abnormalities are part of the core vulnerability in schizophrenia, in comparison to bipolar psychotic disorder.

2002-2007 Co-Investigator NIH/NIMH R01MH062152
(PI: L. Seidman)
Neuroanatomy of Adult ADHD -- An MRI Morphometric Study
This study investigated the neuroanatomical correlates of ADHD in adult subjects using structural MRI.

2003-2005 Co-Investigator NIH/NINDS R01NS042861
(PI: D. Rosas)
Prospective Neuroimaging in Huntington's Disease
This study investigated the brain morphometry of individuals with Huntington's disease for the elucidation of underlying brain alterations in this disease.

2003-2006 Co-Investigator US Army/ONDCP DABK39-03-C-0098
(PI: H. Breiter)
Phenotype Genotype Project in Addiction and Depression
This study investigated the genetic and neuroanatomical correlates of altered behaviors in subjects with cocaine dependence and major depression using multimodal imaging.

2003-2008 Co-Investigator NIH/NIMH R01MH067980
(PI: J. Schmahmann)
Cognitive Effects of Cerebellar Lesion in Humans
This study investigated structural-behavioral correlations in subjects with stroke lesions in the cerebellum using MRI.

2004-2009 Co-Investigator NIH/NIDA R01DA017905
(PI: B. Kosofsky)
Structural MR Analyses of Drug Exposed Brains
Utilized automated segmentation tools and validated the application of such tools to the analysis of a set of structural MR scans obtained from 8-12-year-old children exposed to cocaine in utero as compared with controls.

2004-2009 Co-Investigator NIH/NCRR P41RR014075
(PI: B. Rosen)
Center for Functional Imaging Technologies
This project aimed to develop and optimize novel functional imaging technologies to be applied in normality and disease states.

2004-2009 Co-Investigator NIH/NIA R01AG022381
(PI: W. Kremen)
The Vetsa Longitudinal MRI Twin Study of Aging
In this study, we proposed to oversee all automated morphometric processing including the application of tools for the generation of cortical surface-based models.

2005-2010 Co-Investigator NIH/NIMH R01MH071467
(PI: C. Schwartz)
Infancy to Adolescence -- fMRI and Risk for Anxiety Disorder

Evaluated the predictive relation between early temperamental biases and the development of social anxiety disorder and profiles of brain activation to theoretically relevant stimuli.

2006-2011 Co-Investigator NIH/NIDCD R01DC000942
(PI: D. Caplan)
Disorders of Syntactic Comprehension
Project studied the nature of aphasic disturbances of syntactically based sentence comprehension, their relation to short-term memory, speed of processing and lexical access and their neuroradiological correlates.

2007-2008 PI NIH/NCCAM P01AT002048
Acupuncture Neuroanatomy and Biostatistics, Core B
Studied the central effects of acupuncture to provide a scientific basis for the understanding of the therapeutic potentials of this ancient healing technique.

2007-2009 Co-Investigator US Army/ONDCP DABK39-03-C-0098/DATM05-02-R
(PI: H. Breiter)
Development of Pattern Variable Technologies for Reward Aversion Behavior (Preferences Dynamics) and Neuroimaging and their Use for Emotional Fingerprinting of Individuals
This proposal addressed the development of Preference Dynamics technology with behavior and imaging. We extended pattern variable analyses in structural and functional imaging in addiction studies.

2007-2011 Co-Investigator NIH/NINDS R01NS052368
(PI: A. Blood)
Basal Ganglia Function in Focal Dystonia
Investigated whether peripheral treatment of focal dystonias with botulinum toxin injections led to a reduction or change in functional and structural brain abnormalities.

2007-2012 Co-Investigator NIH/NIMH R01MH056956
(PI: J. Goldstein)
Gender and Brain Abnormalities in Schizophrenia III
The major goal of this project was to study sex differences in brain abnormalities in schizophrenia and fetal antecedents to explain these abnormalities.

2007-2012 Co-Investigator NIH R01 P50MH080272
(PI: L. Seidman)
Project 1 -- Functional Anatomy of Neurocognitive Deterioration in Schizophrenia
The major goal of the project was to test the hypothesis of functional and prefrontal anatomical deterioration in schizophrenia.

2009-2012 PI NIH/NCCAM (ARRA) P01AT002048
(MPI: B. Rosen)
Anatomic and Functional Image Analysis and Biostatistics Core (Core B)
Studied the central effects of acupuncture and to provide a scientific basis for the understanding of the therapeutic potentials of this ancient healing technique.

2009-2011 Co-Investigator NIH/NEI R01EY019477
(PI: M. Bar)
Prefrontal cortex top-down contribution to object recognition

We proposed to study how predictions in the brain help understand our visual world. This informed clinical models of several neurological disorders, visual deficit in schizophrenia and dyslexia, and demyelination diseases such as multiple sclerosis, Alzheimer's and Parkinson's diseases.

2009-2012 PI NIH/NIMH R21MH084041
Identification and Validation of Human Hypothalamic Nuclei in Vivo and ex Vivo Using 7 Tesla MRI
This project proposed to identify nuclei in the ex vivo and in vivo human hypothalamus using 7T MRI.

2011-2013 Co-Investigator NIH/NIMH R21MH091461
(PI: A. Doyle)
Genetic Imaging of Working Memory and Interference Control in ADHD
This project combined functional and structural neuroimaging data with neurocognitive traits and psychiatric symptoms to explore how compelling ADHD-risk genes impact the brain to produce meaningful variation in behavior.

2009-2014 Co-Investigator NIH/NIMH P50MH086400
(PI: E. Eskandar)
Neurocircuitry underlying effectiveness of DBS in OCD
This project investigated the orbitofrontal and striatal circuit involved in OCD.

2010-2014 Co-Investigator NIH/NIAAA R01AA07112
(PI: M. Oscar-Berman)
Affective and conative changes in alcoholism:
Studied the emotional and memory abnormalities in long-term sober alcoholic subjects and controls using structural and functional MRI.

2009-2014 PI NIH/NIDA R01DA027804
(MPI: H. Breiter)
Imaging of DLPFC and amygdala impact on relative preference in cocaine addiction
It goal was the evaluation of the relationship of brain structures with keypress measures of relative preference.

2012-2015 PI NIH/NINDS R21NS077059
(MPI: B. Dickerson)
Large-scale language networks topography and selective degeneration
Investigated the anatomical and functional neural networks that support language and memory functions in progressive aphasic subjects using multimodal neuroimaging.

2011-2016 Co-Investigator NIH/NIMH R01MH090291
(PI: J. Goldstein)
Fetal Hormonal Programming of Sex Differences in Aging of the Memory Circuitry
Using functional and structural MRI, diffusion tensor imaging (to evaluate white matter morphology), and neuroendocrine evaluations, we tested hypotheses that an abnormal maternal-fetal HPA environment and offspring's genetic polymorphisms contribute to explaining midlife sex differences in functional brain activity deficits and structural brain abnormalities in memory and working memory circuitries (including HIPP, paraHIPP, mPFC and dorsolateral PFC, anterior cingulate gyrus and parietal cortex). This study was a 5-year study as part of a larger 40-

year follow-up of a prenatal cohort. We re-recruited a sample of 200 same-sex sibling pairs, one of whom experienced fetal growth restriction or pre-eclampsia, exposures known to result in adverse maternal-fetal HPA programming and associated with adult memory dysfunction. It provided a unique opportunity to evaluate in humans the impact of an adverse prenatal hormonal environment, known to affect aging, on sex differences in adult memory deficits.

2013-2016 PI NIH/NIBIB R21EB016449
(MPI: G. Bonmassar)
The Virtual Patient Stimulator for Deep Brain Stimulation in OCD
This project focused on the application of a virtual patient stimulator for deep brain stimulation (DBS) to enable useful noninvasive procedures of the DBS system and the development of a new temperature sensor in obsessive-compulsive disorder and other neurological conditions.

2013-2016 PI NIH/NINDS R21NS079905
(MPI: B. Dickerson)
Imaging biomarkers of the FTD-ALS spectrum
This project focused on defining the functional and structural measures of frontal and motor systems of the brain in order to determine whether this knowledge can be used to diagnose and monitor the progression of these disorders.

2014-2016 Co-Investigator NIH/NINDS U01NS083223
(PI: C-F. Westin)
Characterization of White Matter in Huntington's Disease using Diffusion MRI
The purpose of this ancillary grant application was to target our novel advanced diffusion MRI biomarkers and analysis methods to the cortico-striatal pathway, a key area in Huntington's disease motor function symptomatology. By associating abnormalities detected with these novel biomarkers to specific parts of the cortico-striatal tract, our work was to precisely map the relationship between white matter tract degeneration and motor dysfunction.

2011-2017 Co-Investigator NIH/NICHD R01HD067744
(PI: E. Valera)
The role of corticocerebellar pathophysiology in adult ADHD
The long-term objective of this proposal was to increase our understanding of the pathophysiology of attention deficit/hyperactivity disorder (ADHD) by furthering our knowledge regarding how the cerebellum and corticocerebellar circuits contribute to perceptual and motor timing abnormalities in ADHD.

2011-2017 Co-Investigator NIH/NCCAM P01AT006663
(PI: B. Rosen)
Neuroimaging Acupuncture Effects on Brain Activity in Chronic Low Back Pain
This application’s main aim was to build support for a new Center of Excellence for Research on CAM (CERC) to apply neuroimaging methodologies to explore the central mechanisms of acupuncture action in chronic low back pain (cLBP), a clinically significant disorder for which effective modes of treatment are currently lacking.

2016-2018 Co-Investigator NIH/NIMH R03MH111320
(PI: A. Widge)
Computational Modeling of Deep Brain Stimulation of the Ventral Striatum
The main objective of this proposal was the successful deployment of the computational modeling technology, "StimVision", from the McIntyre Lab at Case Western Reserve University

to the deep brain stimulation (DBS) group at Massachusetts General Hospital (MGH).

2017-2018 Co-Investigator NIH/NIMH R56MH113217
(PI: J. Goldstein)
Prenatal Immune Programming of Sex Differences in Dysregulation of Emotion Processing in Midlife
This application's main aim was to test that immune pathway abnormalities, beginning in fetal development, are associated with sex-dependent impacts on HYPO, HIPP, AMYG and PFC, resulting in maladaptive negative emotion processing and MDD/depressed mood symptomatology in early midlife, the latter of which will accelerate aging of this circuitry and negative emotion dysregulation in later midlife.

2015-2019 Co-Investigator NIH/NIMH R01MH074794
(PI: C-F. Westin)
Novel Diffusion MRI Analyses of White Matter in Schizophrenia
The purpose of this grant is to target novel advanced diffusion MRI biomarkers and analysis methods to study new approaches and strategies in the understanding of schizophrenia.

2016-2019 PI NIH/NICCH R21AT008865
(MPI: M. Kubicki)
Effects of Curcumin on Frontal Circuitry in Aging Monkeys using MRI Connectome
The goal of this project is to study the effects of Curcumin (natural phenol and the principal curcuminoid of the spice turmeric, member of the ginger family) in the process of senescence.

2017-2019 Co-Investigator NIH/NIMH R21MH115280
(PI: L. Ning)
Personalized target selection for TMS therapy using functional vs. structural connectivity MRI
In this project, we used state-of-the-art functional connectivity and diffusion MRI data and analyses to quantify and compare, for the first time, the reliability of these methods to identify cortical targets for TMS therapy. In addition, we studied the clinical efficacy of dMRI-guided TMS by retrospectively analyzing the relationship between therapeutic response and location of the stimulated TMS target in relation to the optimal dMRI node. Last, we used sophisticated dMRI metrics to assess the changes in white matter microstructure induced by TMS and how they relate to clinical efficacy (therefore defining anatomical mechanisms of action and therapeutic targets).

Non-Federal

1998-2000 PI NARSAD Young Investigator
Altered Neural Connectivity Underlying Schizophrenia: An Integration of Functional, Metabolic, and Diffusion Weighted Methodologies
This study investigated neurobiological correlates of white matter with attention abnormalities in schizophrenic subjects using multimodal neuroimaging.

2000-2001 PI ALS Association
Neural degeneration in ALS: An integrated MRI assessment of physiology, structure and function
This study investigated longitudinally brain alterations in amyotrophic lateral sclerosis (ALS) using multi-modal neuroimaging.

2009-2010 PI MGH ECOR 213787
Investigated the Cerebral Maturation of ADHD into Young Adulthood -- A longitudinal study
This study investigated the neuroanatomical correlates of ADHD during development using MRI.

2009-2010 PI MGH ECOR 215615
(MPI: Kennedy/Makris)
CMA Data Share: A Public Resource for Morphometric Data
This project proposed the development of a set of integrated neuroinformatics on normative morphometric results generated during the past 22 years by the CMA at MGH.

2011-2012 PI MGH ECOR 221816
(MPI: Dickerson/Makris)
Large-scale language networks: Topography and selective degeneration
Investigated the anatomical and functional neural networks that support language and memory functions in progressive aphasic subjects using multimodal neuroimaging.

2013-2014 PI MGH ECOR 222741
Neural substrates of diffusion imaging in cognitively aging rhesus monkeys
Multidisciplinary analysis of a cohort of rhesus monkey brains by MRI imaging, morphometry, neuroanatomy and cognitive aging to strengthen the biological underpinnings of imaging biomarkers. Evaluated types of longitudinal data of many brain structures now possible with recent developments in diffusion MRI and tractography.

2015-2016 PI MGH ECOR 227208
Effects of Curcumin on Frontal Circuitry in Aging Monkeys using MRI Connectome
The goal of this project was to perform a preliminary study the effects of Curcumin (natural phenol and the principal curcuminoid of the spice turmeric, member of the ginger family) in the process of senescence.

2014-2020 Co-Investigator NIH/NIMH R01MH102377
(PI: M. Kubicki)
Diffusion Imaging Biomarkers for Risk, Onset & Outcome in Schizophrenia
The main goal of this proposal is to identify specific changes in white matter that are related to risk, onset, and outcome of schizophrenia. In order to achieve this goal, we will use several recently developed MRI acquisition and analysis methods, and apply them to distinct schizophrenic and schizophrenia related populations, healthy controls and bipolar patients.

2016-2020 Co-Investigator NIH/NIMH U01MH109977
(PI: M. Shenton)
Human Connectome Project for Early Psychosis
The goal of this study is to acquire high quality imaging, behavioral, cognitive, and genetic data on an important cohort of early psychosis patients, in a manner consistent with the HCP. It will be made available to the research community for future studies. Such data will provide a unique opportunity to characterize the pathological substrates of early psychosis.

2016-2020 Co-Investigator NIH/NICHD R01HD090641
(PI: S. Bouix)
CRCNS: Subject-Specific Diffusion MRI Profiles of Injury in TBI and PTSD

The goal of this project is to develop a robust framework to perform subject-specific neuroimaging analyses of Diffusion MRI (dMRI), as this modality has shown excellent sensitivity to brain injuries and can locate subtle brain abnormalities that are not detected using routine clinical neuroradiological readings.

2016-2020 Co-Investigator NIH/NIMH R01AA007112
(PI: M. Oscar-Berman)
Affective and Conative Changes in Alcoholism
The goal of this project is to study emotional and memory abnormalities in long-term sober alcoholic subjects and controls using structural and functional MRI.

Current

Federal

2016-2021 Co-Investigator NIH OT2OD023867
(PI: V. Napadow)
Mapping the Linkage Between Auricular Vagus Nerve Receptors and Cardiovagal Modulation
The goal of this project is to functionally map the ABVN-brainstem-cardiovagal outflow pathway in both humans and rodents and assess its sensitivity to the modulatory effects of respiration.

2016-2021 Co-Investigator NIH/NIA R01DC014296
(PI: B. Dickerson)
Imaging Tau, Amyloid, and Neurodegeneration in PPA
The goal of this project is to translate various novel imaging techniques into clinically useful tools that can be used by clinicians around the country and internationally to improve the diagnostic specificity and assessment capabilities for PPA and its subtypes.

2017-2021 PI NIH/NIDA R21DA042271 $438,860
(MPI: J. Camprodon)
Modulating Inhibitory Control Networks in Gambling Disorder with Theta Burst Stimulation
In this project, we will implement multimodal structural magnetic resonance imaging (MRI) and functional MRI methods of analysis in a population of patients affected by gambling disorder undergoing neuromodulation for cognitive control in order to further our understanding in these areas of inquiry.

2017-2021 PI NIH/NIMH R01MH111917 $2,148,981
(MPI: D. Dougherty, Y. Rathi)
Patient-specific, Effective, and Rational Functional Connectivity Targeting for DBS in OCD
The goal of this project is a retrospective investigation of imaging-based targeting for Deep Brain Stimulation (DBS) for severe obsessive-compulsive disorder (OCD). We will use anatomic and functional connectivity analyses, plus electrical modeling, to identify white and grey matter zones that must be captured by the electrical stimulation to yield clinical response.

2017-2022 Co-Investigator NIH/NIMH R01MH112737
(PI: J. Camprodon)
A Transdiagnostic Assessment of Electroconvulsive Therapy Modulation of Anhedonia and Reward Circuitry: Targets, Biomarkers and Predictors of Response

The goal of this project is to take advantage of the high efficacy and fast response of ECT to (1) identify much-needed treatment targets, and develop high impact clinical tools, namely (2) biomarkers and (3) predictors of response. Our approach is circuit-centered and transdiagnostic, focusing on reward networks and their associated clinical dimensions across diagnoses that are common indications for ECT.

2017-2022 PI NIH/NIMH R01MH112748 $3,835,312
(MPI: S. Bouix, M. Kubicki)
High Resolution, Comprehensive Atlases of the Human Brain Morphology
The goal of this project is to generate and disseminate state-of-the-art, high-resolution full brain MR atlases, as the extension of the previous version of the Harvard-Oxford Atlas (HOA), a popular and widely available atlas through FMRIB Software Library (FSL) atlas.

2018-2023 Co-Investigator NIH/NIMH R01MH116173
(PI: K. Setsompop)
Next generation in-vivo diffusion imaging at submillimeter resolution
In this grant, we propose to develop novel ways to acquire and reconstruct diffusion MRI data leading to a quantum jump in spatial resolution in a clinically feasible scan time. The acquired data can show anatomical structures of the in-vivo brain at an unprecedented level of detail, which heretofore has not been possible using existing technology.

2018-2023 Co-Investigator NIH/NINDS R01NS102574
(PI: O. Wu)
Multimodal Network Connectivity Architecture (MOCA) of the Brain and Its Role in the Recovery of Consciousness in Comatose Cardiac Arrest Patients
In this grant, we propose a prospective observational study in cardiac arrest patients still comatose 24 hours post-arrest, or 24 hours post-rewarming in those treated with targeted temperature management. Our study focuses on patients for whom prognostication is typically most challenging, and who are most likely to benefit from advanced assessment tools. Our aim is to determine whether acute MRI and electrophysiology can identify which patients are most likely to regain arousal.

2018-2023 Co-Investigator NIH/NIA R01AG057505
(PI: J. Goldstein)
Aging of Emotion Circuitry: Impact of Sex, Depression, and Fetal Immune Origins
This application's main aim is to test that immune pathway abnormalities, beginning in fetal development, are associated with sex-dependent impacts on HYPO, HIPP, AMYG and PFC, resulting in maladaptive negative emotion processing and MDD in early midlife. Further, aging of NAffec circuitry (i.e., decline) into later midlife will be accelerated by MDD in early midlife, resulting in greater deficits in negative emotion processing in later midlife, that we predict will differ by sex, i.e. women worse than men. We will examine this for the first time in humans using data from our prenatal cohort prospectively followed since 2nd/3rd trimesters and assessed at ages 44-50 in a previous NIH study, in which we investigated fetal programming of sex differences in MDD.

2018-2023 PI NIH/NIMH K24MH116366 $816,750
Mentoring and neuroimaging research on new targets for DBS in OCD
The goal of this project is to support mentoring and training of the PI and junior scientists in clinical research aimed at understanding biological mechanisms of brain pathology affecting

connectivity in OCD.

2013-2024 PI NIH/NIA R01AG042512 $728,931
(MPI: M. Kubicki, D. Rosene)
Neural substrates of diffusion imaging in cognitively aging rhesus monkeys
Multidisciplinary analysis of a cohort of rhesus monkey brains by MRI imaging, morphometry, neuroanatomy and cognitive aging to strengthen the biological underpinnings of imaging biomarkers, and to validate the possibility of longitudinal data of many brain structures now possible with recent developments in diffusion MRI and tractography.

2019-2024 Co-Investigator NIH/NIMH R01MH119222
(PI: Y. Rathi)
Harmonizing multi-site diffusion MRI acquisitions for neuroscientific analysis across ages and brain disorders
The major goal of this study is the development of novel mathematical algorithms to remove scanner-specific differences from data acquired at multiple sites. We also aim to develop a formal ontology-based system for defining 189 white matter fascicles using neuroanatomical landmarks known from human and monkey literature on brain connectivity. We will use a web-based system for real-time 3D viewing and querying of the harmonized data and fascicles (integrating with NIMH data archive infrastructure) for a user-defined selection of subjects from the entire cohort of subjects across different diagnostic categories.

2019-2023 Co-Investigator NIH/NINDS R01NS112694
(PI: E. Valera)
Impact of intimate partner violence-related mild traumatic brain injuries on neural, cognitive, and psychological health of women
The major goals of this project are to understand the sequelae of intimate partner violence-related traumatic brain injury.

2019-2024 Co-Investigator NIH/NIA R01AG067019
(PI: J. Goldstein)
Impact of Depression on Alzheimer's disease: Prenatal Immune Origins and Shared Impact of Sex
Major depressive disorder (MDD), which has twice the risk in women than men, is a risk factor of Alzheimer’s disease (AD). Further, both disorders are highly related to vascular compromise and neurovascular dysfunction. However, despite the strong comorbidity between MDD, AD, and neurovascular dysfunction, little is known about the shared pathophysiology that underlies these prominent disorders. We will test the hypothesis that sex differences in AD pathology and neurovascular dysfunction are, in part, mediated by MDD through dysregulation of shared immune and stress pathways beginning in fetal development.

2021-2026 PI NIH/NIMH R01MH125860 $883,940
(MPI: LJ. O’Donnell, N. Makris, Y. Rathi)
Mapping the superficial white matter connectome of the human brain using ultra high resolution multi-contrast diffusion MRI
The major goal of this project is to map the u-fibers of the human brain using ultra high resolution diffusion MRI.

Projects Submitted for Funding

Federal

Pending; Submitted 06/2020
Mapping the superficial white matter connectome of the human brain using ultra high resolution multi-contrast diffusion MRI
NIH/NIMH R01
(MPI: L. O'Donnell, Y. Rathi, N. Makris) – Annual Direct Costs Requested – $571,419
The major goal of this project is to map the u-fibers of the human brain using ultra high resolution diffusion MRI.
SRG Action: Impact/Priority Score: 22 Percentile: 6.0

Pending; Submitted 09/2020
Development and Validation of Innovative Extracellular Vesicles-based Treatment for Spinal Cord Injury in the Long-tailed Cynomolgus Monkey.
NIH Directors Transformative Research Award R01
(MPI: N. Makris, Y. Rathi, D. Rosene) – Annual Direct Costs Requested – $1,684,895
The goal of this project is to assess the efficacy of a novel treatment in spinal cord injury (SCI) using a sustained bio-delivery of mesenchymal stem cells-derived extracellular vesicles (EVs) released from a hydrogel at the site of injury.

Pending; Submitted 10/2020
Hydrogel-delivered extracellular vesicles (EVs) to induce recovery of motor function following cortical injury.
NIH/NINDS R21
(MPI: N. Makris, T. Moore) – Direct Costs Requested – $275,000
The goal of this project is to build a non-human primate rhesus macaque model for assessing the efficacy of Hydrogel-delivered extracellular vesicles (EVs) to induce recovery of motor function following cortical injury.

Report of Local Teaching and Training

Teaching of Students in Courses

1985-1989	Course in Acoustic Physics Speech Pathology students	Institute of Medical Physics, School of Allied Health Professions University of Siena Siena, Italy 30 hrs
1987-1989	Effects of Electromagnetic Fields on Biosystems Undergraduate/Graduate students	School of Posturography and Biomagnetism UFR-Paris-Nord Bobigny, France 4 hrs
1995-2009	Functional MRI Visiting Fellowship: A five-day intensive introduction course series Research staff	Visiting Fellowship Program, Massachusetts General Hospital 30-min lecture, 2x year
1999	HST 130/Neurobiology 200 Teaching Fellow Neuroanatomy Lab section	HMS & Massachusetts Institute of Technology

	Graduate students	Boston, MA 2 hrs/week for 12 weeks
2000	Human Nervous System and Behavior Course Lab Instructor Medical students	HMS Boston, MA 2 hrs/week for 8 weeks
2001	Research Update in Neuroscience for Neurosurgeons (RUNN) course Lab Instructor	Marine Biological Laboratory, Woods Hole, MA Weeklong course (8 hrs)
2002-2004	Core neuroanatomy for morphometric analysis Research staff/technicians	Massachusetts General Hospital 1 hr/week
2016	Brain Connectivity in Imaging Perspective Visiting Professor Psychiatry residents	Neurosciences, Psychology, Drug Research and Child Health (NEUROFARBA) University of Florence Florence, Italy 4 hrs/week for 4 weeks
2018	Human Neuroanatomy in Neuroimaging Perspective Visiting Professor Psychologists, Neuropsychologists, Psychoanalysts & Graduate Students	Istituto Erich Fromm Prato, Italy 4 hrs/week for 4 weeks

Laboratory Supervisory and Training Responsibilities

2015-	Supervision of one postdoctoral research fellow and multiple research staff	Center for Morphometric Analysis, MGH One hour lab meeting per week for research staff; 1:1 supervision one hour per week for research fellow
2015-	Supervision of two assistant professors and two postdoctoral research fellows	Psychiatry Imaging Laboratory, BWH One hour lab meeting per week; 1:1 supervision one hour per week

Mentored Trainees and Faculty

1993-1994	Rene Metz, M.D., Professor of Neurology, Catholic University of Louvain (UCL), Brussels-Woluwe, Belgium. Mentored in neuroanatomy and brain morphometry while he was a Visiting Research Fellow, in Neurology at MGH/HMS.

1995-1997	James Meyer, M.D., Section head of Interventional Radiology at Holy Family Hospital, Lawrence MA. Mentored in neuroanatomy, brain morphometry and various neuroimaging techniques while he was employed as a software developer, in Neurology at MGH/HMS.
1996-1998	Julie Goodman, Ph.D., Union of Concerned Scientists, Earthwatch Institute, Tellus Institute, Newton Eco Teams Project, Boston, MA. Mentored in neuroanatomy and brain morphometry while she was an Instructor, in Radiology at MGH/HMS.
1996-1998	Julie Bates, Ph.D., Instructor in Psychiatry, MGH/HMS. Mentored in neuroanatomy and brain morphometry while she was a Postdoctoral Research Fellow, in Psychiatry at MGH/HMS.
1998-2000	Igor Gratchev, M.D., Ph.D., New Growth Franchise Global Head, Clinical, Medical and Drug Safety, GSK (Formally Novartis), Parsippany, New Jersey. Mentored in neuroanatomy and brain morphometry while he was a Research Fellow, in Neurology at MGH/HMS.
1998-2000	Michael Cirillo, Ph.D., Neuropsychology practitioner, Worcester, MA. Mentored in neuroanatomy and brain morphometry while he was a Visiting Research Fellow, in Neurology at MGH/HMS.
1998-2000	Monica Strauss, Ph.D., Athinoula A. Martinos Center, Boston, MA. Mentored in neuroanatomy and brain morphometry while she was a Visiting Research Fellow, in Radiology at MGH/HMS.
2000-2002	Diana Rosas, M.D., Associate Professor of Neurology, HMS. Neurologist, MGH. Director, Center for Neuro-imaging of Aging and Neurodegenerative Disease (See Bibliography portion of CV for co-authorship on scientific publications). Mentored in neuroanatomy while she was an Instructor, in Neurology at MGH/HMS.
2000-2002	Kathleen Hui, M.D. Mentored in neuroanatomy while she was an Instructor and Assistant Professor, in Radiology at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
2001-2003	Hackjin Kim, Ph.D., Director, Laboratory of Social and Decision Neuroscience. Associate Professor, Department of Psychology, Korea University, Seoul, South Korea. Mentored in neuroanatomy and brain morphometry while he was a Research Fellow, in Neurology at MGH/HMS.
2001-2003	Tsutomu Takahashi, M.D., Ph.D., Professor, Department of Neuropsychiatry, Toyama University, Toyama Japan. Mentored in neuroanatomy while he was a Visiting Research Fellow in Neurology at MGH/HMS.
2001-2003	Masanori Takeoka, M.D., Assistant Professor of Neurology, HMS. Physician at Boston Children's Hospital, Boston MA.

Mentored in neuroanatomy while he was a medical resident at MGH/HMS.

2002-2003 Ennio Montinaro, M.D., Neurologist at S Eugenio Public Hospital, Rome, Italy (See Bibliography portion of CV for scientific publications).
Mentored in neuroanatomy and brain morphometry while he was a Visiting Research Fellow in Neurology at MGH/HMS.

2000-2004 Larry Seidman, Ph.D. Professor of Psychology (HMS), Department of Psychiatry in the MMHC Public Psychiatry Division of the Beth Israel Deaconess Medical Center (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy when he was Associate Professor in Psychiatry at MGH/HMS.

2000-2004 Jill Goldstein, Ph.D., Professor and Director of Women's Health Research, Brigham and Women's Hospital, Harvard Medical, Boston, MA. Director of the Women's Health Center, Brigham and Women's Hospital. (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy when she was Associate Professor in Psychiatry at MGH/HMS.

2000-2004 Jean Frazier, M.D., Professor of Psychiatry, University of Massachusetts Medical School, Worcester, MA (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy when she was Associate Professor in Psychiatry at MGH/HMS.

2000-2004 Randy Gollub, M.D., Ph.D., Psychiatrist at MGH
Mentored in neuroanatomy while she was an Instructor in Psychiatry at MGH/HMS (See Bibliography portion of CV for co-authorship on scientific publications).

2002-2004 Mitsuhiro Nishida, M.D., Department of Pediatrics, Dokkyo Medical University, Tochigi, Japan.
Mentored in neuroanatomy while he was a Visiting Research Fellow in Neurology at MGH/HMS.

2000-2006 Scott L. Rauch, M.D., President, Psychiatrist in Chief, and Rose-Marie & Eijk van Otterloo Chair of Psychiatry, McLean Hospital and Chair of Partners Psychiatry and Mental Health (PPMH) (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy while he was Assistant, Associate, and Full Professor in Psychiatry at MGH/HMS.

2000-2006 Martha Herbert, M.D., Ph.D., Assistant Professor of Neurology at Harvard Medical School, a Pediatric Neurologist and Neuroscientist at the Massachusetts General Hospital in Boston, and an affiliate of the Harvard-MIT-MGH Martinos Center for Biomedical Imaging, where she is director of the TRANSCEND Research Program (Treatment Research and Neuroscience Evaluation of Neurodevelopmental Disorders). She is the author of the public-oriented book, The Autism Revolution: Whole Body Strategies for Making Life All It Can Be. (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy while she was a medical resident in Neurology at MGH/HMS.

2000-2014 Hans Breiter, Ph.D., Professor, Psychiatry and Behavioral Sciences, Northwestern University (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations). Mentored in neuroanatomy while he was Assistant and Associate Professor in Radiology at MGH/HMS.

2000-2014 Gordon Harris, Ph.D., Professor, Department of Radiology, Harvard Medical School. Director, 3D Imaging Service, Massachusetts General Hospital (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).
Mentored in neuroanatomy while he was Associate and Full Professor in Radiology at MGH/HMS.

2000-2010 Heidi Thermenos, Ph.D., Assistant Professor in Psychiatry at MGH/HMS
Mentored in neuroanatomy while she was an Instructor in Psychiatry at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2000-2018 Eve Valera, Ph.D., Assistant Professor in Psychiatry at MGH/HMS
Mentored in neuroanatomy while she was an Instructor in Psychiatry at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2004-2018 Vitaly Napadow, Ph.D., Associate Professor in Radiology at MGH/HMS
Mentored in neuroanatomy while he was an Instructor, Assistant and Professor in Radiology at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2005-2006 Matthew Jerram, Ph.D., Associate Professor of Psychology at Suffolk University
Mentored in neuroanatomy and brain morphometry while he was a research fellow in Psychiatry at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2005-2007 Rudolph Pienaar, Ph.D., Staff Scientist, Department of Radiology, Boston Children's Hospital, Boston, MA. Instructor in Radiology, HMS
Mentored in neuroanatomy and brain morphometry while he was a research fellow in Radiology at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2006-2011 Myong Sun Choe, M.D., Pediatrics Dept., Boston Children's Hospital, Boston MA
Mentored in neuroanatomy and brain morphometry while she was a visiting research fellow in Neurology at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2006-2014 Isabelle Rosso, Ph.D., Assistant Professor of Psychology at McLean Hospital/HMS
Mentored in neuroanatomy and brain morphometry while she was a Postdoctoral Research Fellow in Psychiatry at MGH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2007-2012 Laura Holsen, Ph.D., Assistant Professor of Psychiatry, HMS & Brigham and Women's Hospital.
Mentored in neuroanatomy as a Research Fellow BWH/HMS.

2008-2010 Kelimer Milad, Ph.D., Instructor, Department of Psychiatry, MGH.
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a Postdoctoral Research Fellow, at MGH.

2008-2010 Samantha Huang, Ph.D., Research Staff at Beth Israel Deaconess Medical Center
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a doctoral candidate in Behavioral Neuroscience at Boston University's School of Medicine, Boston MA.

2008-2015 Lichen Liang, Ph.D., Research Scientist, MGH
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a Postdoctoral Research Fellow at MGH.

2008-2014 Brandon Abbs, Ph.D., senior medical writer and public speaker for TESARO Inc.
Mentored in neuroanatomy and brain morphometry while he was a Research Fellow and Lecturer in Psychiatry at BWH/HMS (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations).

2009-2013 Belen Pascual, Ph.D., Assistant Professor in Neurology, Weill Cornell Medical College, Houston TX
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a Postdoctoral Research Fellow, Department of Neurology, MGH (See Bibliography portion of CV for co-authorship on scientific publications).

2009-2014 Jiliang Fang, Ph.D., Professor, Guang An Men Hospital, China
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a Postdoctoral Research Fellow, Department of Radiology, MGH (See Bibliography portion of CV for co-authorship on scientific publications).

2010-2012 Maria Ida Iacono, Ph.D. Research Scientist, U.S. Food and Drug Administration (FDA), Silver Spring, MD.
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a visiting PhD candidate (Polytechnic University of Milan, Milan, Italy) and Postdoctoral Research Fellow, Department of Radiology, MGH (See Bibliography of CV for first author and co-authorship on papers).

2011-2014 Swathi Kiran, Ph.D., Professor, Department of Speech, Language, and Hearing Sciences. Research Director, Aphasia Resource Center, Boston University.
Mentored in neuroanatomy and brain morphometry as an Associate Professor, Department of Speech, Language and Hearing Sciences, Boston University, Boston MA.

2011-2014 Nicole McLaughlin, Ph.D., Assistant Professor of Psychiatry and Human Behavior, Brown University, Providence RI.
Mentored in neuroanatomy and brain morphometry as a postdoctoral research fellow at MGH/HMS.

2012-2013 Meina Quan, M.D., Ph.D., Research Scientist, Nankai University School of Medicine, Tianjin, The People's Republic of China.
Mentored in neuroanatomy and brain morphometry as a Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, and Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, VA Boston Healthcare System, Brockton, MA and Harvard Medical School.

2012-2014 Ziad Safadi, Ph.D., Research Scientist at University of Rochester Medical Center at Rochester NY (Department of Pharmacology and Physiology)
Mentored in neuroanatomy, brain morphometry and diffusion imaging as a visiting research fellow at MGH/HMS.

2012-2014 Demian Wassermann, Ph.D., Associate Research Professor, Parietal team, French Institute for Research in Computer Science and Automation (INRIA)
Mentored in neuroanatomy and brain morphometry as a Post-doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, and Laboratory of Mathematical Imaging, and Surgical Planning Laboratory, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Mentored Demian during the development of the White Matter Query Language (WMQL), a technique to formally describe white matter tracts and to automatically extract them from diffusion MRI datasets.

2012-2013 Inga Koerte, M.D. Professor in the Department of Pediatric Psychiatry, Ludwig-Maximillian-University of Munich, Germany (2013).
Mentored in neuroanatomy and brain morphometry as a Visiting Lecturer and Research Associate in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, from Ludwig-Maximillian-University, Munich, Germany. Else-Kröner-Fresenius- Stiftung, Germany, 2-year Research Fellowship, 1 out of 3 stipends of the Else-Kröner Memorial Award (2012-present).

2012-2014 Hesham Hamoda, M.D., Psychiatrist, Boston Children's Hospital
Mentored in neuroanatomy and brain morphometry as a Clinical Fellow in Psychiatry, Children's Hospital, Harvard Medical School, and Fellow, Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School. Recipient of a Dupont-Warren Fellowship, Harvard Medical School, and a Livingston Fellowship Award, Harvard Medical School.

2012-2014 Sylvain Bouix, Ph.D., Associate Director, Psychiatric Imaging Laboratory, BWH
Mentored in neuroanatomy and brain morphometry as an Assistant Professor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry Brigham and Women's Hospital, Harvard Medical School, Boston, MA. (Center for Integration of Medicine and Innovative Technology-CIMIT Solider in Medicine Award and R01 funding from NIMH from 2009 to 2014).

2012-2018 Zora Kikinis, M.D. Investigator/Instructor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School (See Bibliography of CV for first author and co-authorship on papers).

2012-2018 Marek Kubicki, M.D., Ph.D., Professor of Psychiatry and Radiology, HMS
Mentored in neuroanatomy and brain morphometry as an Associate Professor, Departments of Psychiatry and Radiology, Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA (See Bibliography of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings, and NIH grants).

2012-2016 Ofer Pasternak, Ph.D., Instructor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School.
Mentored in neuroanatomy and brain morphometry as a Post-doctoral Research Fellow and NARSAD Young Investigator Award, 2013-2015.

2012-2018 Yogesh Rathi, Ph.D., Associate Professor of Psychiatry and Radiology, HMS
Mentored in neuroanatomy and brain morphometry as an Assistant Professor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School (Information System and Research Council grant award; "Diffusion Modeling and Fiber Cup Award" for the best tractography algorithm competition held during MICCAI – Medical Image Computing and Computer Assisted Intervention Conference, 2009). October 2012: New and Notables: The NIMH has cited Dr. Rathi's R01 recently funded research among new investigators. This project will use new computational and acquisition approaches in order to shorten the time needed for conducting advanced diffusion imaging. 2013: selected to participate in the course for HMS Leadership Development for Physicians and Scientists (See Bibliography of CV for co-authorship on papers).

2012-2016 Peter Savadjiev, Ph.D., Assistant Professor of Psychiatry and Radiology, HMS
Mentored in neuroanatomy and brain morphometry as a Post-doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. (Recipient of the 2009 MICCAI Young Scientist Award for the best paper: http://ubimon.doc.ic.ac.uk/MICCAI09/m773.html) (See also CV for publications).

2014-2015 Takeshi Sasaki, M.D., Physician, Toshima Hospital, Tokyo, Japan
Mentored in neuroanatomy and brain morphometry as a Visiting Post-Doctoral Research Fellow in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA. He received his training from the Tokyo Visits Program for Accelerating Brain Circulation" sponsored by the Japan Society for the Promotion of Science. Dr. Sasaki has a background in PET imaging and was mentored by Dr. Makris in diffusion MR imaging and neuroanatomy. Medical and Dental School (TMDU), and is sponsored by the TMDU-HMS exchange program entitled "the Strategic Young Researcher Overseas".

2014-2015 Sarah Burke, Ph.D., Post-doc researcher at Netherlands Institute for Neuroscience, Amsterdam, Netherlands.
Mentored in neuroanatomy and morphometry while she was a visiting research fellow at MGH.

2014-2016 Emad Ahmadi, M.D., Resident of Radiology and Biomedical Imaging, Yale University School of Medicine.
Mentored in neuroanatomy and morphometry as a research fellow in Radiology at MGH/HMS.

2015	Mateus Aranha, M.D., Physician, Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil. Mentored in neuroanatomy while he was a visiting research fellow at MGH.
2015-2018	Kyriakos Dalamagkas, M.D., Medical Resident, TIRR Memorial Hermann, Houston, TX Mentored in neuroanatomy, brain morphometry, diffusion imaging, tractography as a visiting research fellow at BWH.
2015-2017	Chris Lepage, M.D., Clinical Psychologist, University of Ottawa in Ontario, Canada Mentored in neuroanatomy, brain morphometry, diffusion imaging, tractography and functional MRI as a visiting predoctoral research fellow at BWH.
2016-2018	David Perez, M.D., Neurologist, MGH Mentored in neuroanatomy and multimodal structural/functional magnetic resonance imaging (MRI) techniques (including brain morphometry, resting-state functional connectivity and diffusion tensor imaging tractography). He was awarded a K23 aiming to investigate structural and functional MRI biomarkers of symptom severity, adverse life event burden (a FND risk factor) and prognosis across motor FND.
2018-present	Richard J Rushmore, Ph.D., Assistant Professor of Anatomy & Neurobiology, Boston University School of Medicine Mentoring in neuroanatomy and multimodal structural/functional magnetic resonance imaging (MRI) techniques (including brain morphometry, resting-state functional connectivity and diffusion tensor imaging tractography).
2018-present	Alexandra Touroutoglou, Ph.D., Assistant Professor of Neurology, HMS/MGH Mentoring in neuroanatomy and multimodal structural/functional magnetic resonance imaging (MRI) techniques (including brain morphometry, resting-state functional connectivity and diffusion tensor imaging tractography). She was awarded a K23 aiming to investigate any potential benefits of non-invasive repetitive transcranial magnetic stimulation (rTMS) to behavior and language neurocircuit in patients with Primary Progressive Aphasia (PPA).
2019-present	Magda Tsintou, M.D., Instructor in Psychiatry, HMS/MGH Mentoring in neuroanatomy and multimodal structural/functional magnetic resonance imaging (MRI) techniques (including brain morphometry, resting-state functional connectivity and diffusion tensor imaging tractography).

Dr. Makris has also mentored in neuroanatomy and supervised numerous research assistants and students (graduate, undergraduate, and high-school) over the years at both MGH (Center for Morphometric Analysis, CMA) and BWH (Psychiatric Neuroimaging Laboratory, PNL). See below for those who followed careers in neuroscience research and medicine.

Year(s)	**Name**	**Lab**	**Role**	**Career Development / Current position**
1997-1999	Mark Patti	CMA	Research Assistant	Co-author in 2 publications during his lab tenure. Attended New York Medical College and is currently a practicing physician
1997-1999	Camille McPherson	CMA	Research Assistant	(Obstetrics & Gynecology).

1998	Ned Sahin	CMA	Visiting student	Co-author in 2 publications during his lab tenure; Ph.D. at Harvard in Cognitive Neuroscience; he is the founder of *Brain Power*, a company dedicated in the application of new innovative wearable technologies (e.g. Google Glass) in neuroscience; current projects focusing on children with autism.
1998-2000	Shuna Klaveness	CMA	Research Assistant	DVM at VCA Veterinary Specialty Center in Seattle, WA.
1998-2000	Jason Tourville	CMA	Research Assistant	Co-author in 2 publications during his lab tenure; Ph.D. in Cognitive and Neural Systems at Boston University, where he is currently a Research Assistant Professor.
1999-2001	Andrea Boehland	CMA	Research Assistant	Attended medical school at Oregon Health & Science University; currently practicing as an Emergency Medicine specialist.
1999-2001	Rebecca Melrose	CMA	Research Assistant	Ph.D. in Clinical Psychology at Boston University; currently practicing Psychology at UCLA.
1999-2004	Megan Dieterich	CMA	Research Assistant	Co-author in 3 publications during her lab tenure.
2000-2002	Ethan Segal	CMA	Research Assistant	Co-author in 3 publications during his lab tenure; Studied medicine at Tufts University School of Medicine; currently at UMass Memorial Medical Center.
2000-2002	Jennifer Koch	CMA	Research Assistant	Co-author in 1 publication during her lab tenure; continued graduate studies in biostatistics at Boston University.
2001-2003	Heather Sanders	CMA	Research Assistant	Co-author in 1 publication; studied medicine at University of Pittsburgh; currently practicing Pediatrics in Rochester, NY.
2001-2004	Joseph Normandin	CMA	Research Assistant	Co-author in 1 publication during his lab tenure; Ph. D. in neuroscience at Georgia State University (GSU); currently, a Neuroscience Lecturer at GSU.
2001-2008	Christian Haselgrove	CMA	Research Technologist	Co-author in 9 publications; currently at UMass Medical Center in Worcester, MA.
2001-2012	Denise Boriel	CMA	Research Assistant	Co-author in 6 publications; currently, Project Coordinator at Genzyme in Grafton, MA.
2002-2004	Matthew Albaugh	CMA	Research Assistant	Co-author in 3 publications during his lab tenure; Ph.D. in Clinical Psychology at UVM; currently a Postdoctoral associate at UVM; sponsoring him in a K08 Mentored Clinical Scientist Research Career Development award application.
2002-2004	John Schlerf	CMA	Research Assistant	Co-author in 2 publications during his lab

				tenure; moved on for doctoral studies in Neuroscience at University of California, Berkeley. Received competitive fellowship from the NSF (top 15%).
2002-2004	Liesbeth De Fosse	CMA	Research Assistant	Co-author in 1 publication during her lab tenure.
2002-2004	Todd Ahern	CMA	Research Assistant	Co-author in 3 publications during his lab tenure; accepted to a Ph.D. program in Neuroscience at Emory University; currently an Assistant Professor in Psychology and Behavioral Neuroscience at Quinnipiac University.
2002-2008	Steven Hodge	CMA	Research Assistant	Co-author in over 20 publications during his lab tenure; currently, teaching faculty at UMass Medical Center, in Worcester, MA.
2003-2005	James Howard	CMA	Research Assistant	Co-author in 3 publications; moved on for a Ph.D. in Neuroscience at Northwestern; published in Neuron and Nature Neuroscience.
2003-2005	Kalika Kelkar	CMA	Research Assistant	Co-author in 1 publication during her lab tenure.
2003-2005	Sean McInerney	CMA	Computer Scientist	Co-author in 3 publications; moved on to industry as a software engineer/developer.
2003-2012	John Kaiser	CMA	Research Technologist	Co-author in 8 publications during his lab tenure.
2004-2006	Mike Schiller	CMA	Research Assistant	Co-author in 1 publication during his lab tenure.
2004-2007	Lena Tang	CMA	Research Assistant	Co-author in 3 publications during her lab tenure; currently, a Nurse Practitioner at MGH.
2004-2008	Jeremy Jackson	CMA	Research Assistant	Studied at University of Pennsylvania; currently, a Nurse Anesthetist at MGH.
2005-2006	Baker Hamilton	CMA	Research Assistant	Attended medical school at Perelman School of Medicine University of Pennsylvania; currently specializes in Emergency Medicine at Cambridge Hospital (MA).
2005-2007	John Bruyere	CMA	Research Assistant	Co-author in 1 publication during his lab tenure; attended medical school at Marshall University; currently, Child Neurology resident at Marshall, Department of Pediatrics.
2005-2007	Scott Sorg	CMA	Research Assistant	Co-author in 3 publications during his lab tenure; moved on to UCSD to attend a Ph.D. program in Neuroscience; currently, at VA San Diego Healthcare System.
2007-2010	Michelle Giddens	CMA	Research Assistant	Co-author in 1 publication during her lab tenure; currently a Ph.D. student in

				Neuroscience at Emory University.
2010-2012	Brianne Campbell	CMA	Research Assistant	Co-author in 2 publications during her lab tenure.
2011-2013	Maria Giulia Preti	CMA	Ph.D. Thesis	Co-author in 4 publications; currently, a Postdoctoral fellow in Neuroradiology at École Polytechnique Fédérale de Lausanne (Switzerland).
2012-2013	Paula Pelavin	PNL	Research Assistant	Co-author in 1 publication during her lab tenure.
2012-2013	Mai-Anh Vu	PNL	Research Assistant	Co-author in 2 publications during her lab tenure; currently, a graduate student in Cognitive Neuroscience at Duke University.
2012-2014	Brian Dahlben	PNL	Research Assistant	Currently a medical student, at Sidney Kimmel Medical College, Thomas Jefferson University.
2012-2014	Eli Fredman	PNL	Research Assistant	Currently a medical student, at School of Medicine and Health Sciences, George Washington Univ.
2013-2014	Elisa Scaccianoce	CMA	Master of Science Thesis	Currently, Ph.D. candidate at Polytechnic University of Milan (Italy).
2013-2016	Anni Zhu	PNL	Research Assistant	Currently, graduate student in computer science at University of Pennsylvania.
2014	Antoni Kubicki	CMA	Summer student	Undergraduate student in Neuroscience at UVM.
2014	Alberto Garrido	CMA	Summer student	Undergraduate student in Neuroscience at Autonomous University of Madrid (UAM), Spain.
2014-2016	Palig Mouradian	CMA	Research Assistant	Co-author in 1 publication.
2012-present	Isaac Ng	CMA	Research Assistant	Co-author in 1 publication.
2019-2020	Senthil Palanivelu	CMA	Research Assistant	Co-author in 1 publication.
2019-present	Peter Wilson-Braun	CMA	Research Assistant	Co-author in 2 publications (under review)

Local Invited Presentations

Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.

1995	MRI-based Morphometric Analysis of the Human Brain/ Seminar Nuclear Magnetic Resonance Center, MGH
1998	Human white matter parcellation using diffusion weighted and conventional MR imaging/ Seminar Behavioral Neuroscience Seminars, Brigham Behavioral Neurology Group, Division of Cognitive and Behavioral Neurology, BWH
1999	Cortical Parcellation of the Neocortex using MRI/ Invited presentation Neurology Department, MGH
2005	Anatomic Mapping: Automation and Neural Systems Specificity/ Invited presentation Center for Psychopathology at the MGH Pediatric Psychopharmacology Unit, Copley Plaza Boston, MA **(Janssen, Johnson & Johnson)**

2006 Selective Cortical Abnormalities in Adults with ADHD; a Structural MRI Study/ Invited presentation
Neuroscience Research Presentation, Psychiatry Department, MGH

2008 Neuroimaging Methods/ Course in Human Neuropsychology
The Massachusetts Mental Health Center; Public Psychiatry Division of the Beth Israel Deaconess Medical Center, Department of Psychiatry, HMS

2010 Human Association Fiber Pathways: The Superior Longitudinal Fascicle and its Relationship to Language/ Seminar
Psychiatry Neuroimaging, BWH

2011 Novel Evidence of Fiber Pathways using Diffusion Imaging/ Seminar
Neuroscience Research Meeting, Psychiatry Department, McLean Hospital

2020 Research Domain Criteria (RDoC) and brain circuits in neuromodulation / Behavioral Neurology CME Lecture
Departments of Neurology and Psychiatry, MGH

Report of Regional, National, and International Invited Teaching and Presentations

Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.

Regional

1998 Topographic and volumetric analysis of human white matter based on MRI technology/ Seminar
Program in Brain, Behavior and Cognition, Colloquium Series
Department of Psychology, Boston University, Boston, MA

National

1997 In vivo parcellation of the human brain/ Invited presentation
NIMH, NINDS, NICHD, Tools for Pediatric Neuroimaging, Inter-Institute Group for Pediatric Neuroimaging, Washington, DC

2000 Quantitative Morphometric Analysis: Segmenting and Parcellating Gray and White Matter/ Special lecture
Departments of Biological Psychiatry and Neuroscience, Columbia University, NY

2000 Diffusion Tensor Imaging: Strengths and Limitations
Diffusion Tensor MRI (DT-MRI): "From Bench to Bedside"; session on “Structure and Architecture of the Normal Brain”, National Institutes of Health, Bethesda, MD

2001 MRI-based Morphometric Analysis of the Human Brain/ Invited presentation
Brain Research Imaging Center, Department of Neurology, The University of Chicago, Chicago, IL

2001 Delineation of Cerebral Connections using Diffusion Tensor MRI/ Invited presentation
139-74 Beckman Institute, Biological Imaging Center, Caltech, Pasadena, CA

2003 Frontiers in Neuroimaging/ Invited presentation
Veterans Integrated Services Networks, Veteran Affairs
San Antonio, TX

2004 Studying Neural Systems with Neuroimaging/ Invited presentation
Cold Spring Harbor Laboratory: Brain Architecture, Cold Spring Harbor, NY

2006 Brain Abnormalities in Adults with ADHD assessed with MRI/ Invited presentation
McNeil Presentation on ADHD

Titusville, NJ **(Janssen, Johnson & Johnson)**

2006 White Matter Analyses in Humans using Imaging/ Invited presentation
The Banbury Center, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

2007 White Matter Analyses: A Systems Perspective using Multimodal Imaging/ Invited presentation
The Banbury Center, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY

2007 Altered Cortical Networks in Adults with ADHD using MRI/ Invited presentation
American Academy of Child and Adolescent Psychiatry, Boston, MA

2008 Methods in Morphometric Analysis and Anatomic Mapping: Towards Automation and Neural Systems Specificity/ Invited presentation
Center for the Neurobiology of Learning and Memory, University of California Irvine, Irvine, CA

2014 Medicine, Neuroscience and Imaging/ Invited presentation
Special Guest Lecture, Florida State University College of Medicine, Tallahassee, FL

International

1997 In vivo MRI-based parcellation of the human brain/ Special guest lecture
The Hospital for Sick Children, Toronto, Ontario

2000 Studying Cerebral Connections in the Living Human/ invited presentation
Meeting in Hypertension
Aristotelian University of Thessaloniki, Thessaloniki, Greece

2000 Anatomic consequences of stroke: neurobiological implications/ invited presentation
Department of Neurology, National University of Athens Medical School, Athens, Greece

2000 Understanding the in vivo Anatomic Connectivity in the Human Brain/ invited presentation
Member-initiated Symposium: "Diffusion Imaging in the Brain: From Protons to Pathways."
Sixth Annual Meeting of the Organization for Human Brain Mapping, San Antonio, TX, USA

2002 White Matter Anatomy and Functional Connections in the Brain/ invited presentation
International Society for Magnetic Resonance in Medicine (ISMRM) Meeting, Honolulu, HI, USA

2002 Anatomic Mapping: Towards Automation and Neural Systems Specificity/ invited presentation
Brainstorm 2002: The Future of Neuroimaging First International Meeting, Athens, Greece

2002 Diffusion Tensor Imaging/ invited presentation
Brainstorm 2002: The Future of Neuroimaging First International Meeting, Athens, Greece

2005 Cortical Abnormalities in Adults with ADHD using MRI/ invited presentation
XIII World Congress of Psychiatry, Cairo, Egypt

2006 Selective Structural Deficiencies of Cortical Networks for Attention and Executive Function in Adults with Attention Deficit-Hyperactivity Disorder using MRI/ invited presentation
Advances in ADHD Research International Congress, Istanbul, Turkey

2007 Structural Deficiencies in Adults with ADHD with ADHD with and without Comorbid Bipolar Disorder using MRI/ invited presentation
XIII International ESCAP Congress "Bridging the Gaps," Florence, Italy

2008 Altered Cortical Networks in Adults with ADHD using T1-Weighted and DT-MRI/ invited presentation
XIV World Congress of Psychiatry, Prague, Czech Republic

2009 Frontal lobe cortical-limbic deficiencies in adults with ADHD with ADHD comorbid with bipolar disorder: A cortical thickness MRI analysis/ invited presentation
9th World Congress of Biological Psychiatry, Paris, France

2009 Cortical Neural Systems Abnormalities in adults with ADHD and ADHD plus BPD comorbidity/ invited presentation
Donders Institute, Nijmegen, The Netherlands

2010 Neuroimaging in ADHD/ invited presentation
Targeted Expert Meeting-Child and Adolescent Neuropharmacology, Amsterdam, The Netherlands

2011 Brain correlates of ADHD behaviors in medication-naïve adults with ADHD: a controlled MRI study/ invited presentation
XV World Congress of Psychiatry, Buenos Aires, Argentina

2012 The integrated response of the human cerebro-cerebellar and limbic systems to acupuncture stimulation at ST36 as evidenced by fMRI/ invited presentation
International Symposium of fMRI study on Brain effects of Acupuncture. Beijing, China

2013 Towards defining the neural substrates of ADHD: a controlled structural MRI study in medication-naïve adults/ invited presentation
ADHD Worldwide – The 1st Joint Meeting, Tel Aviv, Israel

2014 Imaging in Cognitive and Clinical Neuroscience/ invited presentation
COGNITIVE 2014 – The Sixth International Conference on Advanced Cognitive Technologies and Applications, Venice, Italy

2015 Brain Circuitries in Basic and Clinical Neuroscience/ invited presentation
Seventh International Conference on Creative Content Technologies, Computation World 2015, Nice, France

2015 Imaging Brain Circuitries using Connectome Technology in Cognitive and Clinical Neuroscience/ invited presentation
Politechnico Di Milano, Milano, Italy

2015 Imaging Brain Circuitries in Basic and Clinical Neuroscience/ invited presentation
Eginitio Hospital, Athens, Greece

2016 How is Current Imaging Technology Shaping Clinical Research and Practice/ invited presentation
Society of Physicians and Surgeons of Corfu, Corfu, Greece

2017 Applied Systems Neuroanatomy using Neuroimaging/ invited presentation
Psychoanalysis and Neuroanatomy International Seminar, University of Florence, Italy

2018 The Impact of Imaging Technology and Computational Methodology in Systems Neuroanatomy and Precision Psychiatry/ invited presentation
Institut du Cerveau et de la Moelle épinière (ICM), Hôpital de la Pitié-Salpétrière, Paris, France

2018 A Neuronatomical Systems Perspective of White Matter Query Language and its Clinical Relevance in current Neuropsychiatric Research/ invited presentation
NeuroSpin, Université Paris Saclay, INRIA, Paris, France

2019 Brain Mapping/ invited presentation
Universidad de Las Palmas de Gran Canaria, Las Palmas, Gran Canaria, Spain

2019 Moderator, Break-out Session on Neuroanatomical Ontology titled "New names, old names: how do we assign names to brain structures?"
Universidad de Las Palmas de Gran Canaria, Las Palmas, Gran Canaria, Spain

2019 MRI-based Parcellation of the Human Brainstem/ invited presentation
Hanse-Wissenschaftskolleg Institute for Advanced Study, Delmenhorst, Germany

2019 The Impact of Diffusion Imaging Technology in Brain Structural Connectivity and in Shaping Current Neuroscience Research and Clinical Practice/ invited presentation
German Cancer Research Center, Division of Medical Image Computing, Heidelberg, Germany

2019 Systems Neuroanatomy and Current Neuroimaging: Their Impact in Basic and Clinical Neurosciences/ invited presentation
Department of Psychiatry, University of Florence, Florence, Italy

2019 White Matter Fiber Tracts and Systems Neuroanatomy/ invited presentation
Fraunhofer Institute for Digital Medicine MEVIS, Bremen, Germany

2019 The Current Neuroscience in Behavioral and Drug Addictions - the Stigma

Society of Physicians and Surgeons of Corfu, Corfu, Greece

2019 Neurosciences of Behavioral and Drug Addictions and the Emergence of Neuropsychoanalysis
Istituto Erich Fromm, Prato, Italy

2019 Neurobiology and Circuits of Behavioral Addictions: A Novel RDoC Perspective
Scuola Marescialli e Brigadieri Carabinieri, Florence, Italy

2020 High Resolution Brain Segmentation
NA-MIC Project Week 33, January 20-24, 2020 in Las Palmas, Gran Canaria, Spain.

2020 Brain white matter of social cognition in schizophrenia and healthy controls
NA-MIC Project Week 33, January 20-24, 2020 in Las Palmas, Gran Canaria, Spain.

2020 Research Domain Criteria (RDoC) and neuroanatomy for neuromodulation
ECNP Masterclass, Istituto di Neuroscienze, in Florence, Italy (June 5, 2020).

Report of Scholarship

Publications

Peer-Reviewed Publications

Research Investigations

1. Di Massa A, Vigliano R, Ianniello L, Nami R, Lucani B, **Makris N**, Rigato M. Prostaglandin (PGE2) plasma level during magnetotherapy. *Acts Accademia dei Fisiocritici of Siena* 1986; XV(V): 145-148.
2. Rigato M, **Makris N**, Fortunato M. A method for measurements in vivo of skin viscoelasticity. *Acts Accademia dei Fisiocritici of Siena* 1987; XV(VI): 125-128.
3. Rigato M, **Makris N**, Fortunato M. Method of measuring in vivo the skin Young's modulus. *Acts Accademia dei Fisiocritici of Siena* 1987; XV(VI): 121-124.
4. Rigato M, Fortunato M, **Makris N**. Comparisons of mathematical models for rotational method of measuring in vivo skin Young's modulus. *Acts Accademia dei Fisiocritici of Siena* 1987; XV(VI): 49-52.
5. Rigato M, **Makris N**. On measurements of skin elasticity in vivo by Graham's method. *Acts Accademia dei Fisiocritici of Siena* 1987; XV(VI): 27-31.
6. **Makris N**, Rigato M, Fortunato M, Criscuolo S, DiMassa A. Neurophysiological aspects of the placebo effect during antalgic therapy. *Acts Accademia dei Fisiocritici of Siena* 1988; XV(VII): 95-98.
7. Caplan D, Gow D, **Makris N**. Analysis of lesions by MRI in stroke patients with acoustic-phonetic processing deficits. *Neurology*. 1995 Feb;45(2):293-298. PubMed PMID: 7854528.
8. Caplan D, Hildebrandt N, **Makris N**. Location of lesions in stroke patients with deficits in syntactic processing in sentence comprehension. *Brain*. 1996 Jun;119 (Pt 3):933-949. PubMed PMID: 8673503.
9. Breiter HC, Gollub RL, Weisskoff RM, Kennedy DN, **Makris N**, Berke JD, Goodman JM, Kantor HL, Gastfriend DR, Riorden JP, Mathew RT, Rosen BR, Hyman SE. Acute effects of cocaine on human brain activity and emotion. *Neuron*. 1997 Sep;19(3):591-611. PubMed PMID: 9331351.
10. Seidman LJ, Faraone SV, Goldstein JM, Goodman JM, Kremen WS, Matsuda G, Hoge EA, Kennedy D, **Makris N**, Caviness VS, Tsuang MT. Reduced subcortical brain volumes in nonpsychotic siblings of schizophrenic patients: a pilot magnetic resonance imaging study. *Am J Med Genet*. 1997 Sep 19;74(5):507-514. PubMed PMID: 9342202.
11. **Makris N**, Worth AJ, Sorensen AG, Papadimitriou GM, Wu O, Reese TG, Wedeen VJ, Davis TL, Stakes JW, Caviness VS, Kaplan E, Rosen BR, Pandya DN, Kennedy DN. Morphometry of in vivo human white matter association pathways with diffusion-weighted magnetic resonance imaging. *Ann Neurol*. 1997 Dec;42(6):951-962. PubMed PMID: 9403488.
12. Worth AJ, **Makris N**, Caviness VS, Kennedy DN. Neuroanatomical Segmentation in MRI:

Technological Objectives. *Int J Pattern Recogn*. 1997 Dec; 11(8):1161-1187. doi: 10.1142/S0218001497000548
13. Grachev ID, Breiter HC, Rauch SL, Savage CR, Baer L, Shera DM, Kennedy DN, **Makris N**, Caviness VS, Jenike MA. Structural abnormalities of frontal neocortex in obsessive-compulsive disorder. *Arch Gen Psychiatry*. 1998 Feb;55(2):181-182. PubMed PMID: 9477933.
14. Vaina LM, **Makris N**, Kennedy D, Cowey A. The selective impairment of the perception of first-order motion by unilateral cortical brain damage. *Vis Neurosci*. 1998 Mar-Apr;15(2):333-348. PubMed PMID: 9605533.
15. Worth AJ, **Makris N**, Patti MR, Goodman JM, Hoge EA, Caviness VS Jr, Kennedy DN. Precise segmentation of the lateral ventricles and caudate nucleus in MR brain images using anatomically driven histograms. *IEEE Trans Med Imaging*. 1998 Apr;17(2):303-310. PubMed PMID: 9688163.
16. Kennedy DN, Lange N, **Makris N**, Bates J, Meyer J, Caviness VS Jr. Gyri of the human neocortex: an MRI-based analysis of volume and variance. *Cereb Cortex*. 1998 Jun;8(4):372-384. PubMed PMID: 9651132.
17. Gollub RL, Breiter HC, Kantor H, Kennedy D, Gastfriend D, Mathew RT, **Makris N**, Guimaraes A, Riorden J, Campbell T, Foley M, Hyman SE, Rosen B, Weisskoff R. Cocaine decreases cortical cerebral blood flow but does not obscure regional activation in functional magnetic resonance imaging in human subjects. *J Cereb Blood Flow Metab*. 1998 Jul;18(7):724-734. PubMed PMID: 9663502.
18. Jenkins BG, Chen YI, Kuestermann E, **Makris NM**, Nguyen TV, Kraft E, Brownell AL, Rosas HD, Kennedy DN, Rosen BR, Koroshetz WJ, Beal MF. An integrated strategy for evaluation of metabolic and oxidative defects in neurodegenerative illness using magnetic resonance techniques. *Ann N Y Acad Sci*. 1999; 893:214-242. PubMed PMID: 10672240.
19. Goldstein JM, Goodman JM, Seidman LJ, Kennedy DN, **Makris N**, Lee H, Tourville J, Caviness VS Jr, Faraone SV, Tsuang MT. Cortical abnormalities in schizophrenia identified by structural magnetic resonance imaging. *Arch Gen Psychiatry*. 1999 Jun;56(6):537-547. PubMed PMID: 10359468.
20. Seidman LJ, Faraone SV, Goldstein JM, Goodman JM, Kremen WS, Toomey R, Tourville J, Kennedy D, **Makris N**, Caviness VS, Tsuang MT. Thalamic and amygdala-hippocampal volume reductions in first-degree relatives of patients with schizophrenia: an MRI-based morphometric analysis. *Biol Psychiatry*. 1999 Oct 1;46(7):941-954. PubMed PMID: 10509177.
21. Kennedy DN, O' Craven KM, Ticho BS, Goldstein AM, **Makris N**, Henson JW. Structural and functional brain asymmetries in human situs inversus totalis. *Neurology*. 1999 Oct 12;53(6):1260-1265. PubMed PMID: 10522882.
22. Hui KK, Liu J, **Makris N**, Gollub RL, Chen AJ, Moore CI, Kennedy DN, Rosen BR, Kwong KK. Acupuncture modulates the limbic system and subcortical gray structures of the human brain: evidence from fMRI studies in normal subjects. *Hum Brain Mapp*. 2000;9(1):13-25. PubMed PMID: 10643726.
23. Caviness VS Jr, **Makris N**, Lange NT, Herbert M, Kennedy DN. Advanced applications of MRI in human brain science. *Keio J Med*. 2000 Jun;49(2):66-73. PubMed PMID: 10900831.
24. Rauch SL, Kim H, **Makris N**, Cosgrove GR, Cassem EH, Savage CR, Price BH, Nierenberg AA, Shera D, Baer L, Buchbinder B, Caviness VS Jr, Jenike MA, Kennedy DN. Volume reduction in the caudate nucleus following stereotactic placement of lesions in the anterior cingulate cortex in humans: a morphometric magnetic resonance imaging study. *J Neurosurg*. 2000 Dec;93(6):1019-1025. PubMed PMID: 11117844.
25. Rauch SL, **Makris N**, Cosgrove GR, Kim H, Cassem EH, Price BH, Baer L, Savage CR, Caviness VS Jr, Jenike MA, Kennedy DN. A magnetic resonance imaging study of regional cortical volumes following stereotactic anterior cingulotomy. *CNS Spectr*. 2001 Mar;6(3):214-222. PubMed PMID: 16951656.
26. Poellinger A, Thomas R, Lio P, Lee A, **Makris N**, Rosen BR, Kwong KK. Activation and habituation in olfaction--an fMRI study. *Neuroimage*. 2001 Apr;13(4):547-560. PubMed PMID: 11305885.
27. Goldstein JM, Seidman LJ, Horton NJ, **Makris N**, Kennedy DN, Caviness VS Jr, Faraone SV, Tsuang MT. Normal sexual dimorphism of the adult human brain assessed by in vivo magnetic resonance

imaging. *Cereb Cortex*. 2001 Jun;11(6):490-497. PubMed PMID: 11375910.
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29. Goldstein JM, Seidman LJ, O'Brien LM, Horton NJ, Kennedy DN, **Makris N**, Caviness VS Jr, Faraone SV, Tsuang MT. Impact of normal sexual dimorphisms on sex differences in structural brain abnormalities in schizophrenia assessed by magnetic resonance imaging. *Arch Gen Psychiatry*. 2002 Feb;59(2):154-164. PubMed PMID: 11825137.
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32. DaSilva AF, Becerra L, **Makris N**, Strassman AM, Gonzalez RG, Geatrakis N, Borsook D. Somatotopic activation in the human trigeminal pain pathway. *J Neurosci*. 2002 Sep 15;22(18):8183-8192. PubMed PMID: 12223572.
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34. Caviness VS, **Makris N**, Montinaro E, Sahin NT, Bates JF, Schwamm L, Caplan D, Kennedy DN. Anatomy of stroke, Part II: volumetric characteristics with implications for the local architecture of the cerebral perfusion system. *Stroke*. 2002 Nov;33(11):2557-2564. PubMed PMID: 12411642.
35. Rauch SL, Phillips KA, Segal E, **Makris N**, Shin LM, Whalen PJ, Jenike MA, Caviness VS Jr, Kennedy DN. A preliminary morphometric magnetic resonance imaging study of regional brain volumes in body dysmorphic disorder. *Psychiatry Res*. 2003 Jan 20;122(1):13-19. PubMed PMID: 12589879.
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37. Faraone SV, Seidman LJ, Kremen WS, Kennedy D, **Makris N**, Caviness VS, Goldstein J, Tsuang MT. Structural brain abnormalities among relatives of patients with schizophrenia: implications for linkage studies. *Schizophr Res*. 2003 Apr 1;60(2-3):125-140. PubMed PMID: 12591577.
38. Herbert MR, Ziegler DA, Deutsch CK, O'Brien LM, Lange N, Bakardjiev A, Hodgson J, Adrien KT, Steele S, **Makris N**, Kennedy D, Harris GJ, Caviness VS Jr. Dissociations of cerebral cortex, subcortical and cerebral white matter volumes in autistic boys. *Brain*. 2003 May;126(Pt 5):1182-1192. PubMed PMID: 12690057.
39. Rauch SL, Shin LM, Segal E, Pitman RK, Carson MA, McMullin K, Whalen PJ, **Makris N**. Selectively reduced regional cortical volumes in post-traumatic stress disorder. *Neuroreport*. 2003 May 23;14(7):913-916. PubMed PMID: 12802174.
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morphogenetic model based upon MRI analysis. *Cereb Cortex*. 2003 Dec;13(12):1299-1312. PubMed PMID: 14615296.
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Theses

1. La popolazione cellulare delle lesioni periapicali croniche nell' uomo: caratterizzazione istochimica all' alfa- naftil-acetato-esterasi. Department of Human Normal Anatomy; University of Siena; Italy; 1985. Thesis for M.D. degree.
2. Ricerche preliminari sulla terapia antalgica della lombalgia mediante campi elettromagnetici variabili a bassa frequenza e sull' associato effetto placebo, tramite un procedimento in doppio cieco. Department of Anesthesioliogy and Intensive Care; University of Siena; Italy; 1989. Thesis for degree in Anesthesiology and Intensive Care.
3. Analisi morphometrica cerebrale umana basata sulla risonanza magnetica e parcellazione corticale: Metodologia ed applicazioni nel campo delle neuroscienze cliniche e sperimentali. Department of Neural and Mental Disorders; University of Siena; Italy; 1994. Thesis for degree in Psychiatry.
4. Delineation of Human Association Fiber Pathways using Histologic and Magnetic Resonance Methodologies; Department of Behavioral Neuroscience; Boston University School of Medicine; 1999. Thesis for Ph.D. degree.

Narrative Report

I am a neuroanatomist, imager, and trained psychiatrist whose work is principally in human and non-human primate quantitative neuroanatomy and the development of imaging methodologies that translate basic brain science into the clinical domains of psychiatry, neurology and neurosurgery.

Area of Excellence: Investigation

My principal accomplishments are in the fields of structural and functional brain imaging and imaging method development to solve problems in brain structure and function in studying aging and neuropsychiatric conditions such as neurodegeneration, drug addiction, psychosis, and stroke. My lab has been at the forefront of MRI brain morphometry and diffusion imaging of brain circuitries since the beginning of these fields of research (Makris et al., 1999; Caviness et al., 1999). In 1997, we validated the diffusion tensor imaging (DTI) methodology based on the traditional and established anatomy of fiber pathways in humans and showed for the first time the association corticocortical fiber tracts in the human brain *in vivo* (Makris et al., 1997). The color-coding model that my team at MGH envisioned and established for DTI in 1997 (i.e., the XYZ/RGB model) has now become a prevailing convention in the field of DTI and is the standard in publications. It is also applied clinically by radiologists worldwide in routine practice.

My expertise in human neuroanatomy has been critical in the original validation of High-Angular Resolution Diffusion Imaging (HARDI) or Diffusion Spectrum Imaging (DSI) (Touch et al., 2002) as well as of the internationally used automated methodologies for brain morphometric analysis, namely brain segmentation and cerebral cortical parcellation distributed by the FreeSurfer software (Fischl et al., 2002, 2004). Furthermore, using DTI we conceptualized and defined the human superior longitudinal fascicle (SLF) as composed of four components (Makris et al., 2004), which eventually became the standard in the field for this fiber tract and the language circuitry in humans. One component, SLF I, was delineated for the first time in human neuroanatomy. A few years later my team, using DTI tractography, discovered another novel long association corticocortical fiber pathway in humans, which we named middle longitudinal fascicle (MdLF) (Makris et al., 2008, 2012). These two were the first such discoveries of novel fiber tracts in the human brain using imaging technology. The MdLF and extreme capsule (EmC) (Makris and Pandya, 2008) are intimately associated with language function. Combining the MdLF along with a DTI-based description of the EmC we proposed an alternative schema of language circuitry (Makris and Pandya, 2008) which complemented the traditional language model.

Through my lab, I helped lead a number of high profile applications in neurology, neurosurgery and psychiatry such as in stroke (Brain, 2004), cocaine addiction (Neuron, 2004, 2008), Obsessive Compulsive Disorder (OCD) (Yang et al., 2014), Post-Traumatic Stress Disorder (PTSD), schizophrenia (Archives of General Psychiatry, 1999), depression (Yang et al., 2014), autism (Annals of Neurology, 2004), Attention-Deficit/Hyperactivity Disorder (ADHD) and bipolar disorder in children (American Journal of Psychiatry, 2005), Alzheimer's disease (Neuron, 2002), Frontotemporal Dementia (FTD), Huntington's disease (Neurology, 2003) and ALS (Annals of New York Academy of Sciences, 1999). Although I primarily conduct human research, I also study the neuroanatomical correlates of functional senescence in non-human primate models at the Department of Anatomy and Neurobiology at Boston University School of Medicine, where I am an adjunct faculty member. In combined neuroimaging and histological studies with colleagues at the Anatomy and Neurobiology Department of Boston University we have found that functional senescence in macaques is associated with disrupted communication between the frontal lobes and other forebrain regions leading to executive function impairments in normal aging (Makris et al., 2007). As a principal investigator, I am currently involved in five MPI ongoing NIH-funded collaborations studying neuropsychiatric interventions such as Deep Brain Stimulation (DBS) and Transcranial Magnetic Stimulation (TMS), neurodegeneration, normal human anatomy and aging.

I am also a reviewer on grant panels nationally (NIH) and internationally as well as for scientific journals. I am also a member on journal editorial boards, with over 200 publications in peer-reviewed journals. I was recently named by Thompson Reuters to the 2014 List of The World's Most Influential Scientific Minds, an international list of scientists who published the greatest number of the top 1% of cited articles for their field, in one of 21 scientific fields during the decade of 2002-2012.

Teaching

I teach and mentor students, trainees, and colleagues in neuroanatomy and imaging neuroanatomical methods and interpretation, within and outside of Harvard, nationally and internationally, including Italy and Spain. I provide direct supervision to fellows, collaborating clinicians and scientists, undergraduate and graduate students, technologists and technicians in these areas. Further, I have been involved in course work, seminars, and present locally, nationally and internationally at leading scientific congresses. I have been a mentor to several pre- and post-doctoral fellows and research assistants who proceeded to graduate or medical schools and developed successful careers.

In the period 1995-2009, I taught neuroanatomy in the Functional Magnetic Resonance Imaging, Visiting Fellowship Program at MGH. Furthermore, as a group leader, I organized scientific presentations in the lab on a weekly and monthly basis. In 2004, 2006, and 2007 I was involved at the Banbury Center, Cold Spring Harbor, where ad hoc reunions of exclusively invited scientists, where I spent a total of seven working days discussing and teaching comparative brain connectivity. In 2010 and 2014, I co-Directed a four-week course entitled "Anatomical-Numerical Models of Brain and non-Brain Tissues and their Medical Applications" at Massachusetts General Hospital. During the past five years I have taught annually an eight-week course entitled "Neuroanatomy in Imaging Perspective" at the Psychiatry Neuroimaging Laboratory (PNL) at Brigham and Women's Hospital. Recently (March-April 2016), I taught a 4-week (4 hours/week) course for Psychiatry and Neurology residents entitled "Brain Connectivity in Imaging Perspective" at the University of Florence in Florence, Italy. In October 2018 I also taught a 4-week (4 hours/week) course for Psychologists and Neuropsychologists titled "Human Neuroanatomy in Neuroimaging Perspective" at the Istituto Erich Fromm in Prato, Italy.

Currently, I am a mentor in the recently funded MGH Career Development Program in Substance Use and Addiction Medicine, which provides 2-5 years of funding for a clinically trained person to do mentored patient-oriented addiction-related research and to help prepare them for submitting a K23 or R01. Furthermore, I was granted a K24 award in 2018, which includes a strong teaching component. These multidisciplinary clinical research training programs are critical for developing scholars with a concentrated research experience, mentorship, and advanced training to become the next generation leaders in addiction medicine through independent research careers in academics or industry or influential positions in government. Throughout my academic endeavors, I have been committed in helping colleagues and trainees in making sense of systems neuroanatomy and to assist them in the formulation of their hypotheses in a realistic and innovative way within the complex context of current multimodal neuroimaging technology.

Administration and Institutional Service

As the director of the Center for Morphometric Analysis (CMA - https://cma.mgh.harvard.edu) a center dedicated to the study of brain organization in the developing, adult and aging human in normal and diseased states, I support many collaborative projects across the Departments of Neurology, Psychiatry, Neurosurgery and Radiology at MGH, as well as other hospitals within the Harvard system and other institutions nationally and internationally. As the Director of the MGH Morphometric Analysis Center Core and the co-Founder and co-Director of the Center for Neural Systems investigations (CNSi), I support collaborative studies in neural systems biology using imaging in basic and clinical neuroscience. I am a member of MGH/Psychiatry's Departmental Research Committee and Research Steering Committee. I also serve as a member of the MGH Institutional Review Board.

Summary

I am nationally and internationally known as a neuroanatomist and I am a sought-after scientist for my expertise in human neuroanatomy and the development of imaging methods that allow the translation of neuroanatomical knowledge into any clinical arena. I have achieved significant discoveries in the field of neuroanatomy of the human brain and in neuroimaging. I also have a leadership role in teaching and mentoring, and I have considerable administrative responsibilities.